

## REMARKS

United States Serial No. 10/526,953 was filed on November 30, 2005. The application is subject to a final rejection of claims 1-4 and 21-27. In view of the remarks set forth herein, Applicants respectfully request that the rejection of claims 1-4 and 21-27 be withdrawn and that a formal Notice of Allowance be issued with respect to claims 1-4 and 21-27.

### Claim Amendments

Claim 1 has been amended to clarify the subject matter being claimed. Support for these amendments can be found at least at page 5, lines 25-27 of the present specification, as well as claim 1 as previously presented. No new subject matter has been added.

### 35 U.S.C. § 103

Claim 1-4 and 22 have been rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over International Application No. WO 99/18330 to Ellenberger ("Ellenberger") in view of U.S. Patent No. 3,600,899 to Watson, et al. ("Watson").

Preliminarily, Applicants wish to point out that the Final Office Action does not respond to Applicants' assertion that, because of the vast differences between shield tunnel boring machines (as disclosed in Ellenberger) and hard rock tunnel boring machines (as disclosed in the present application), Ellenberger cannot be seen as analogous art to any disclosure of hard rock tunnel boring machines. The Office does not make any showing of facts which would rebut Applicants' arguments. Applicants' arguments to this effect from Response A (paragraph bridging pages 6-7) are as follows:

Ellenberger discloses the boring of relatively soft material by means of a shield boring tunnel machine. In such shield boring tunneling machines, boring liquids or foams are used because they facilitate the removal of the material being bored. The construction of shield tunneling boring machines, which are only used for boring of tunnels in non-rock strata, is substantially different from the construction of hard rock tunnel boring machines. Such hard rock tunnel boring machines contain cutting elements

constructed from hardened steel discs which protrude from the cutting head. In contrast, shield boring tunneling [machines do] not need such hardened steel discs because the material through which [they bore] is much softer.

Applicants note that the Office has admitted, in paragraph 2 of the Final Office Action, that “Ellenberger does not expressly disclose the shield tunnel boring machine as hardened steel with discs that protrude from the cutting edge.” Further, there is no indication in Ellenberger that this limitation is inherent in the disclosure of Ellenberger. Therefore, Ellenberger does not disclose each and every limitation of present claim 1. Applicants respectfully submit that claims 1-4 and 22 are therefore not anticipated by Ellenberger, and request that the 35 U.S.C. § 102(b) rejection of these claims, noted at page 2 of the Office Action, be withdrawn.

Regarding claim 1, it is alleged that Ellenberger discloses a method of boring by means of a tunnel boring machine which performs well when the strata through which a tunnel is being bored is relatively hard, by adding at the cutting head a foamed aqueous liquid composition which comprises a foaming agent and a lubricant, the lubricant being high molecular weight polyethylene oxides. Similarly, it is further alleged, at page 7 of the Final Office Action, that, “[w]hile Ellenberger suggests that the foam is suitable for removal of soil, it also indicates that the foam may be used on shield boring machines which are used in a variety of strata with a rotatable cutting head which performs well in hard and firm strata.”

Applicants respectfully submit that the allegation that Ellenberger discloses, at page 1, lines 12-14, a tunnel boring machine “which performs well when the strata through which a tunnel is being bored is relatively hard” is not entirely accurate, and the disclosure is taken out of context. The full statement in Ellenberger, which appears at page 1, lines 7-17, is a statement of the purpose of the invention of Ellenberger (emphasis added):

Shield tunnel boring machines are increasingly used in the boring of tunnels, because they offer many advantages such as the ability to bore in a wide variety of strata. A shield boring machine comprises a circular rotatable cutting head mounted on a cylindrical shield of similar diameter such that its axis of rotation coincides with the longitudinal axis of the shield. Within the shield there are contained means for feeding materials to the cutting head and means for conveying away the soil. Such machines perform well when the strata through which a tunnel is being bored is relatively hard and firm, but they do not perform so well in soft and crumbly strata which can make soil removal very

difficult. One way of seeking to overcome this problem is to apply a consolidation agent to the soil via the cutting head. This stabilises the soil, allowing boring to be more easily effected and the soil to be more easily removed.

Since the paragraph assumes (as stated in the third sentence) that the strata being bored is soil, the disclosure that “[s]uch machines perform well when the strata through which a tunnel being bored is relatively hard and firm” merely means that the soil being bored can be relatively hard and firm, not that the machine is capable of boring through hard rock. Supporting this implication, the use of the word “firm” seems to be inappropriate to describe hard rock, because the usual meaning of “firm” is something that is slightly malleable. Therefore, Applicants respectfully submit that Ellenberger does not teach or suggest (nor do the combinations discussed below) a method of boring through hard rock as recited in present claim 1, as amended.

At page 7 of the Final Office Action, the Office makes the following statement: “In response to applicant’s argument that a person of ordinary skill in the art would not be motivated to use a boring foam to prevent wear on a steel drill bit that is used to drill hard rock because the foam is also effective when used for boring soft materials as in Ellenberger is not persuasive.” Applicants respectfully submit that the Office has mischaracterized Applicants’ arguments contained in Response A. As stated in the excerpt from Ellenberger quoted above, the purpose of the foam formulation of Ellenberger is to consolidate the soil to facilitate its removal from the area around the cutting head of a shield boring tunnel machine.

The primary purpose of the present foaming agent, as stated at page 1, lines 15-20 of the present specification, is to reduce wear on the cutting heads of a hard rock tunnel boring machine. Specifically, present claim 1 as amended, recites in pertinent part a method of boring hard rock “comprising tunnel boring in hard rock, and adding at the cutting head while boring a foamed aqueous liquid composition injected at the interface of the cutting head and the hard rock.” Applicants respectfully submit that the disclosure of Ellenberger does not teach or suggest that the foam formulation of Ellenberger would be useful for the primary purpose of the

present foaming agent, or that it would be useful if injected at the interface between the cutting head and the hard rock during boring operations. Ellenberger therefore does not teach or suggest all of the elements of present claim 1 as amended.

Applicants respectfully submit that the Office, in the second paragraph of section 5, on page 7 of the Final Office Action, has again mischaracterized Applicants' arguments contained in Response A. Applicants' argument, at page 7 of Response A, stated that, as discussed above, Ellenberger does not disclose a method of boring hard rock, and therefore there is no suggestion or motivation to use the composition of Ellenberger for boring hard rock, much less the optimization of the amount of compound to be used per amount of hard rock to be bored. Thus, Applicants were not arguing that one of skill in the art, after reading the disclosure of the present specification, would not be able to optimize the amount of foaming agent to use, but rather that a person of skill in the art, from reading the disclosure of Ellenberger, would not be able to perform such optimization because there is no disclosure in Ellenberger that the foam formulation of Ellenberger can function to reduce wear on the cutting heads of a tunnel boring machine designed to bore through hard rock.

Regarding claim 1, while the Office has admitted that Ellenberger does not expressly disclose the shield tunnel boring machine as hardened steel with discs that protrude from the cutting edge, the Office Action alleges that Watson discloses: (1) a shield type tunneling apparatus which comprises hardened steel disc cutters which are mounted on the front and may be used on hard rock; and (2) the shield tunnel boring machine may be used in tunneling. For these reasons, it is alleged that it would have been obvious to a person having ordinary skill in the art to use the hardened steel disc cutter mounted on the front as the tunnel boring machine of Ellenberger as it is suitable for hard strata tunneling.

The deficiencies of Ellenberger are discussed in detail above. Applicants respectfully submit that combining Ellenberger with Watson's disclosure of the use of hardened steel discs cutters does nothing to correct these deficiencies. In the absence of hindsight, one would not combine Watson with Ellenberger for boring hard rock because Watson is directed to an apparatus for tunneling through friable ground, the antithesis of hard rock. Even in combination,

the features of the presently claimed subject matter are not disclosed or suggested. Because the deficiencies of Ellenberger are not rectified by combination with Watson, and because the references are not properly combinable, the combination does not suggest the subject matter of present claim 1.

Applicants also wish to point out that Watson does not disclose a shield tunnel boring machine such as that disclosed in Ellenberger. Ellenberger defines a shield tunnel boring machine, at page 1, lines 8-12, as comprising “a circular rotatable cutting head mounted on a cylindrical shield of similar diameter such that its axis of rotation coincides with the longitudinal axis of the shield. Within the shield there are contained means for feeding materials to the cutting head and means for conveying away the soil.” Watson’s disclosure of a shield tunneling apparatus, at col. 1, lines 35-40, states that “[t]he present invention relates to the provision of a tunneling machine or shield designed to permit proper placement and proper support of a system of elongated support poles without any sacrifice in machine operation or shield use, whichever the case may be.” *See also* Fig. 1 of Watson. Thus, the “shield tunneling apparatus” of Watson is much more rudimentary than that of Ellenberger, and would not be seen by a person of skill in the art as the same as the apparatus of Ellenberger.

Further, Applicants respectfully submit that the Office Action’s allegations with respect to this rejection utilize impermissible hindsight, because the motivation relied upon by the office to combine the references is provided solely by the disclosure of the present application. “Any judgment on obviousness is in a sense necessarily a reconstruction based on hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper.” *In re McLaughlin* 443 F.2d 1392, 1395, 170 USPQ 209, 212 (C.C.P.A. 1971) (emphasis added). *See* MPEP at 2100-167. It is respectfully submitted that the reconstruction of the art according to the present specification is improper and does not support the obviousness rejection.

Applicants submit that, since claim 1 is not rendered obvious by the combination of Ellenberger and Watson, for the above reasons, claims 2-4 and 22, which depend ultimately from claim 1, are also non-obvious. *See In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). (“If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious.” MPEP § 2143.03 at page 2100-142.) Applicants respectfully request that the 35 U.S.C. 103(a) rejection of claims 1-4 and 22 be withdrawn.

Claims 21 and 23-27 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ellenberger, in view of Watson, further in view of U.S. Patent No. 4,796,702 to Scherubel (“Scherubel”).

As discussed above, Ellenberger does not suggest all of the elements of present claim 1, nor does the combination of Ellenberger with Watson. The deficiencies of Ellenberger and of the combination of Ellenberger and Watson are not rectified by combination with Scherubel’s disclosure of the use of nonionic surfactants in a multipurpose aqueous foamer. One of skill in the art would not combine Scherubel with Ellenberger, Watson, or a combination of Ellenberger and Watson (if proper), because Scherubel discloses use of a fracturing medium at high pressure, without cutting or boring. It is used to fracture a subterranean formation after the fact; that is, after a well bore has been drilled. It is not suggested to be used in combination with the boring operation. In contrast, Ellenberger discloses injecting an aqueous material while cutting, and Watson discloses an apparatus for boring, but no injection of any liquid medium. For these reasons, a person of skill in the art would not combine these references. Particularly, a person of skill in the art would not derive from this combination the feature of a foamed aqueous liquid composition being injected at the interface of the cutting head and hard rock.

Further, Applicants respectfully submit that the Office Action’s allegations with respect to this rejection utilize impermissible hindsight, because the motivation relied upon by the office to combine the references is provided solely by the disclosures of the present application. *See In re McLaughlin*, cited above.

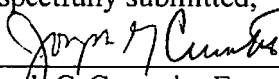
Applicants submit that, since claim 1 is not rendered obvious by the combination of Ellenberger, Watson and Scherubel, for the above reasons, claims 21 and 23-27, which depend ultimately from claim 1, are also non-obvious. *See In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988). ("If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious." MPEP § 2143.03 at page 2100-142.)

Lastly, the Office Action, at page 7, argues that "[t]he fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. *See Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985)." Applicants respectfully submit that the arguments and amendments above show that the presently claimed subject matter does not merely rely on newly recognized advantages disclosed in the prior art; rather, the presently claimed subject matter represents a wholly new and unobvious method for boring hard rock, which is not addressed by the prior art either singly or in combination.

In view of the above remarks, Applicants respectfully request reconsideration of the application and withdrawal of the 35 U.S.C. §§ 102(b) and 103(a) rejections of claims 1-4 and 21-27, and request the issuance of a formal Notice of Allowance with respect to claims 1-4 and 21-27.

Should the Examiner have any questions about the above remarks, the undersigned attorney would welcome a telephone call.

Respectfully submitted,

  
Joseph G. Curatolo, Esq. (Reg. No. 28,837)  
Curatolo Sidoti Co., LPA  
24500 Center Ridge Road, Suite 280  
Cleveland, OH 44145  
Telephone: 440.808.0011  
Facsimile: 440.808.0657  
Attorney for Applicants

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Customer No. 23575